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FOREST PLANTING LEAFLET.

SLIPPERY ELM (*Ulmus pubescens*).

FORM AND SIZE.

The slippery elm when grown in the open is a spreading tree, with a vase-shaped crown, often irregular and one-sided. It is not so large a tree as the white elm, though it occasionally attains a height of 135 feet and a diameter of 4 feet. Usually it is smaller, with an average height of from 60 to 70 feet and a diameter of from $1\frac{1}{2}$ to 2 feet. In the crowded forest the slippery elm grows tall and straight, with a cylindrical trunk undivided for a considerable distance from the ground.

RANGE.

Slippery elm grows from the valley of the lower St. Lawrence southward to Florida, Alabama, and Texas, and westward through southern Canada and the United States as far as North Dakota and central Kansas. Throughout its entire range it is less frequent than the white elm, often occurring as a solitary tree in open woods or fields, or less frequently on the moist banks of streams in almost pure stand. It is found in association with many of our common hardwoods, including the walnuts, hickories, birches, oak, and maples.

The territory in which forest planting of this species seems advisable comprises the entire Mississippi Valley east of the ninety-eighth meridian, from northern Texas to the Red River Valley of the North. Along river valleys it may be planted for some distance west of this line. To the eastward it will thrive even to the Atlantic coast.

HABITS AND GROWTH.

Slippery elm occurs in greatest abundance and attains its largest size in the rich, moist, alluvial soils of stream valleys. Fair-sized trees, however, are produced on rocky hillsides and on rather sterile upland soil, and it is frequently found growing on dry, rough limestone ridges. Slippery elm is about as hardy in dry sites in the prairie States as the white elm, and is drought resistant to a marked degree. Within the limits of its natural range it is seldom injured by climatic extremes.

The tree is moderately shade enduring. On good or medium soil it is a rapid but not persistent grower. Seedlings make a growth of 10 to 18 inches during the first season.

Slippery elm is not so susceptible to injury from cankerworms and other insects as white elm, yet when weakened by drought and lack of nourishment it is often attacked by various insect pests.

ECONOMIC USES.

The wood of the slippery elm is heavy, hard, elastic, strong, moderately durable in contact with the soil, splits easily when green, works fairly well, and stands well if properly seasoned. Careful seasoning and handling are essential for the best results. The heartwood is dark brown or red, the thin sapwood of lighter color. It is said of slippery elm that, unlike most timber, the sapwood, if thoroughly dried, is as durable as the heartwood; hence trees can be utilized for posts when very small. When green, the wood rots very quickly in contact with the ground. Poles for posts should be cut in summer and peeled and dried before setting. The wood is valuable for fuel and fencing. It becomes very tough and pliable when steamed and is of value for sleigh runners and for the ribs of canoes and skiffs. Together with white elm it is extensively used for staves and hoops in slack cooperage, and also for furniture. The thick, viscous inner bark, which gives the tree its descriptive name, is quite palatable, slightly nutritious, and has a medicinal value.

The pleasing outline, luxuriant foliage, and rapid, vigorous growth of the slippery elm make it a general favorite for ornamental planting in parks and along roadsides. Quite as hardy as the white elm, its more valuable timber makes it preferable in wood lots. In a commercial plantation it may be used as the principal species, as a nurse tree, or for underplanting with more valuable or more hardy species.

METHODS OF PROPAGATION.

Slippery elm reproduces both by seeds and sprouts. The coppice sprouts do not develop well enough to make this method of propaga-

tion practicable, so that natural or artificial seeding must be resorted to. On sand bars and along stream banks where the seeds are carried by water, a young growth often springs up, and fresh, moist ground near the parent tree is occasionally reclothed with vigorous seedlings. In general, however, natural seeding from forest stock can not be depended upon.

In establishing a forest plantation the trees should be started from seed sown in a nursery rather than on the permanent site. The seeds, which ripen in May or early June, are produced at rather irregular intervals of from two to four years, and for the most part not abundantly. They may be stripped from the tree by hand or shaken down upon canvas. They may be skimmed from the surface of streams or collected in small quantities where they wash up on sand bars. They must never be allowed to dry out.

Since seed crops do not occur every year and since the seeds will not retain their vitality for more than a few months, there is always danger of getting worthless seeds from seedsmen. Samples may be sent to the Seed Laboratory of the United States Department of Agriculture, where they will be tested without cost.

Slippery elm seed should be sown in the summer as soon as mature, in beds of rich, finely pulverized soil, as free as possible from weed seeds. The seed should be dropped at the rate of about 15 to 1 linear foot of drill, and covered not more than one-half inch deep. The formation of a hard crust must not be allowed on the surface of the seedbeds, and under no circumstances should the seeds be allowed to dry out from the time of ripening until germination is complete. One ounce of seed, containing about 3,400 seeds, is sufficient to sow 225 feet of drills and should produce 2,000 plants.

Uniform moisture conditions in the beds throughout the growing season are essential for rapid growth. With proper care, seed of the slippery elm, sown as soon as it falls from the tree, will germinate and the seedlings make a growth of 10 to 18 inches the first season.

The root system of the slippery elm is composed of numerous deep-seated, fibrous, lateral roots, and the young trees are easily transplanted.

PLANTING.

The young trees should be transplanted to the permanent site in the spring, when 1 year old. For prairie planting they may be set in rows from 4 to 6 feet each way. Where a heavy growth of grass exists it should be turned under a year or two before planting, and if possible a cereal crop grown on the ground. The young trees may be planted in furrows or in holes dug with a spade.

Slippery elm may be grown in a pure stand or in mixtures with white ash, green ash, hardy catalpa, black walnut, locusts, red cedar,

Scotch pine, and black cherry. If combined with black walnut or with conifers, it should not be set in the plantation until the other species are 5 to 6 feet high, or should be so outnumbered that its rapid growth in youth will not cause injury to the associated species, which grow more slowly the first years.

CULTIVATION AND CARE.

Stock should be excluded from the plantation and fire rigidly guarded against. In the prairie region shallow cultivation should be practiced until the young trees shade the ground.

In the east no cultivation will be necessary, because rapid growth keeps the seedlings from being crowded by weeds or grass.

In case of serious attack by insects, specimens should be sent to the Bureau of Entomology of the Department of Agriculture for identification and advice as to treatment.

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